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ABSTRACT

This annotated bibliography includes summaries of ten articles and one book dealing with the use, selection, and care of carpeting in schools. In addition to the citations, there is also an introductory section, which discusses the economic rationale for using carpeting in school buildings and offers recommendations for the selection and proper care of carpeting. Annotations range from approximately 75 to 250 words. (JG)

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Carpet Selection and Rationale for Its Use

Robert Bayman [757]

The debate over whether carpet is a frill or a necessity seems to be pretty much won by those advocating carpet as a sound and reasonable type of floor covering for classrooms. Aside from the fact that most authors advocate its use, and list a multitude of rationale for doing so, the fact that surveys show that over 80% of the schools built since 1970 are carpeting between 50% and 80% of their floors is solid proof that the use of carpet is no longer the "touchy" sometimes emotional subject it once was. In the middle sixties, when carpet first became prominently advocated for school use, carpet was associated in the minds of the American public as a prestigious luxury. In addition, it was widely felt that carpet wouldn't hold up under the stress of the heavy traffic that hundreds of little feet would provide each day.

The foreward looking pioneers who first used it for school hallways and classrooms and a multitude of research have prooved both assumptions to be incorrect. First, carpet can no longer be considered a luxury when looking at it either from an initial cost standpoint of over a life expectancy point of view.

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Advancement in carpet manufacturing technique and increased costs in most hard surface materials has brought the cost of carpet and most hard surface floor coverings into a competitive state. When comparing the "life" cost of carpet to most other material, research shows carpet to be far less expensive. Research has shown the manhours of maintenance to be much less for carpet than tile, vinyl, or nardwood floors Not only is there less labor costs in maintaining carpet, but there are far less costs in materials to do the job. No soaps, sealers, strippers or waxes are needed in the regular maintenance of carpet. Its daily up-keep is done by a vacuum cleaner which requires only a bit of electricity. Bi-annually, annually, or in some cases every two to three years, depending on its use, capret needs to be cleaned. The cost of a good carpet cleaning machine is comparable to the cost of a floor polisher. There, the similarities end, carpet cleaning solutions are relatively inexpensive when compared to sealers, strippers and waxes. Plus, with proper equipment, carpet is cleaned in one procedure while waxing requires a minimum of five times over the same surface; stripping, rinsing, sealing, and two coats of wax. In fact, research shows that a machine that brushes

in the dry foam and vacuums it up in one operation is far superior to all other methods both in its initial removal of dirt and in its resistance to resoiling.

Second, carpet cannot be considered a luxury out of fear that it will not hold up under heavy traffic. Schools, supermarkets, churches, and industry have shown without a doubt that carpet can be used under stress from twelve to twenty years with proper care. In addition, carpet manufactures have added more durability to carpets made in the last three to five years and are continuing to experiment with various materials and combinations of materials.

Proponents of the use of carpet point out that comparing the initial cost of carpet plus the life expectancy maintenance costs to hard surface material (as positive as the comparison is) is really a very narrow comparison. The initial outlay in costs should be compared to other floor covering plus equivalent acoustical materials that are added to a building or room. Long range factors they say should include such things as the thermal value of carpet in holding down both heat and air conditioning energy expenses. Long range comparisons could include such things as the fact that carpet can take the place of furniture by allowing for comfort and warmth for students and staff

to sit on and to do projects on the floor. Hallways can be readily used as extra space in this fashion. They could also include the decline in injuries caused by slipping on a hard floor surface as well as the fact that dust is held in place helping people with allergies and retarding the spread of germs. And, while mentioned only indirectly, it could be pointed out that the acoustical value saves on teachers nerves and thereby reduces the cost of psychiatric help!

Indirectly, it was pointed out that the "open concept" whereby students are encouraged to become physically and actively involved in the classroom procedures would hardly be possible without the use of carpet. Research shows that carpet on the floors cuts the noise level by some 37%, while carpet on the walls cuts the noise level by 24% and the combination of the two retards noise 51%.

In my own experience, our district built a new gymnasium this past year and we carpeted the walls to the height of ten feet. Not only is it no longer difficult to get teachers to accept gym duty but the requests for our gym by the YMCA, Boys' Club, city sports, etc. are double that of all other nearby gyms. Users point out that it's easier to instruct, players remain calmer, and; tongue in cheek, parents remain quieter at games.

Above, I have attempted to summarize the rationale given for the use of carpet. I will devote the remainder of this introduction to the more technical aspects of how to choose the right carpet to meet the traffic as well as the asthetic needs for one's given purpose.

Pile density and yarn weight are important factors when specifying carpeting. Pile density is measured by counting the number of tufts across both the length and width of the carpet. The closer the tufts, the better the carpet, since each individual tuft will have to bear less traffic weight. For commercial use, 7½ tufts per square inch or more on carpets made on a tufting machine or on Wilton or velvet looms is recommended.

Yarn weight refers to the number of ounces of yarn in one square yard of carpet, and a direct relationship exists between the amount of yarn and a carpet's wear life - the more yarn, the more durable the carpet - and the higher the cost.

It is advisable to purchase a carpet with a high, dense pile; if the cost is prohibitive, a low dense pile should be the next choice. When examining the carpet, try to touch the backing with your finger; if you can touch it, the carpet is not dense enough.

Color is an important factor in carpet maintenance. Before deciding on the color of your carpet, consider the following factors: The color of soil varies from one area to another. Where dark soil predominates, it may be wise to choose a dark color for entranceways to camouflage dirt tracked into the building. Solid colored carpets, especially gold or dark colors, magnify soil and will require more cleaning to maintain a high level of appearance. Tweeds or patterned carpets are probably the best choice. However, the very dark and very light ends of the scale should be avoided since they will show soil.

Major points one should consider and a reputable dealer can provide research data about are: durability of fiber, soil resistant ability of fiber, fire resistance or melting point, bacteria resistance, static electricity resistance, cost of cleaning equipment to meet manufacturers cleaning recommendations, colorfastness, shrinkage resistance, acoustical qualities, and stain resistant qualities.

Five main fibers are used in the manufacture of commercial carpeting. They are wool, nylon, acrylic, polypropylene, and polyester. Under the direction of T.J. Wirth, of Buyers Laboratory, Inc., the following

summary of these fibers is provided:

Wool: A durable fiber with good texture retention, it tends to keep soil on the surface and is, therefore, generally easier to maintain; stains, however, may be somewhat difficult to remove.

Nylon: The first synthetic fiber used successfully nylon wears extremely well, is easy to clean and has good stain resistance. It is available in both staple and continuous filament yarns. However, it is a thin yarn, lacking the bounce or bulk found in wool. To counter this lack of bounce, it is advisable to specify a tightly spun, densely packed, loop piled carpet, with a heavy pad underneath. Nylon has a tendency to mat, it attracts soil, and during the last years of its life, loses its high level of appearance. In addition, nylon generates static electricity; manufacturers are now weaving carpeting with metallic wires twisted into the yarn to dissipate the surface charge. Another option is to use anti-static sprays, but regular application is necessary for best results. Nylong has a low melting point and a lighted cigarette dropped onto the carpet can easily cause burns which form a hard bead.

Acrylic: Although it doesn't resist soil as well as wool, acrylic is easy to clean, has a superior stain resistance and excellent texture retention. Like wool, acrylic carpeting maintains its high level of appearance until the last years of its life, and unlike nylon, it does not generate static electricity. Acrylic has a high resistance to acid and alkaline chemicals and thus a variety of cleaning agents can be used without fear of damage.

Polypropylene: Although this fiber has excellent stain resistance (including urine, paint, etc.), good wear and high abrasion resistance, it has a tendency to mat. Like nylon, a lighted cigarette dropped onto the carpet will melt the fibers and cause a hard bead to form.

Polyester: A relatively new fiber with good wear resistance and color fastness. Since it is less resilient than nylon and wool, a dense pile construction is required.

It should be noted that when purchasing a carpet containing different fibers, the higher the percentage of a given fiber, the more the carpet will take on the qualities of that fiber; at least 20 percent of a fiber must be present if the characteristics of that fiber are to be apparent. For example, a carpet containing 80 percent nylon and 20 percent acrylic will have both the durability of nylon plus the stain resistance and texture retention of acrylic. **

In summary, perhaps the greatest difficulty is not in the technical selection of the proper fiber and other specifications, but rather in convincing school boards and patrons that carpet is in the total analysis the best floor covering to use in most instances. While nationwide, this battle seems to be won, there are still many rural Oregon communities in which a psychological issue that must be dealt with. It is hoped that for those who are contemplating building new or remodeling old schools that this paper will provide sufficient argument and evidence to persuade the "doubters" in their districts that using carpet is more than a mere passing fancy. In addition, it may provide enough technical information to alert a superintendent to the specifics that should be included in any specifications drawn by an architect or consultant.

** American School and University, 46, 8 (October 1973) p.48

Note To Instructor:

Most of the articles I was able to find on carpet dealt mainly with the rationale for using carpet and mentioned points to consider in its selection only in passing. Therefore, desperate to find enough articles, I felt compelled to broaden the subject to include rationale of use of carpet as well as points on selection. In addition, I could find no articles in Resources in Education or the Current Index to Journals in Education. I looked under a number of Key Words in both resources such as carpet, rugs, floor covering, interiors, acoustics, building, classrooms, classroom environments, maintenance of floors, etc. and have included the one article I felt came nearest the subject mostly as an example of how difficult it was to find articles on selection of carpet.

Last, because I feel this paper is not fully what you requested, I had intended to discuss my difficulties with you. However, due to the death of my wife's grandfather, and the fact that we were the only relatives in the area to tend to arrangements, the week of July 7, to July 11, was ruined as far as summer school was concerned as you may have noticed by my absence on the 7th and the 10th.

Be that as it may, following are the abstracts:

Abrɔmson, Paul "Acoustical Floor Covering Comes of Age." American School and University, 46, 3 (Novermber 1973) pp. 35-36

Ten years ago, "acoustical floor covering" was a euphemism to camouflage a good idea. The idea, basically, was to carpet floors to cut down on noise problems in the classroom. The change in thinking and attitude about carpet as an expensive status symbol, to carpet as a practical, useful idea is discussed.

The basic thrust of the article is to examine an American School and University survey about how widespread the use of carpet is in new construction. Of 221 schools who returned the survey, 87% used carpet in some or all areas. 21.7% of the schools had between 10 and 20% of their schools carpeted while on the other end of the scale, 26.1% of the buildings built in the past two years had 90 to 100% of the floorspace carpeted. Only 34.6% fell in the area between 10 and 50% carpeted while 65.4% of the buildings had between 51 and 100% of their floor space carpeted.

Anonymous "Carpeting Trends: Better Fibers, Financing." Nation's Schools, 87, 3 (March 1971) pp. 82-83

In addition to pointing out various aspects of using carpet this article has two unique points. One, is its mention of the weaving of electrical wire into the carpeting fiber to create a magnetic field which restricts sounds to the area in which they originate. The other is a description of carpet tests; what they mean, and how accurate they may be considered to be. There are nine specific tests that are given by most carpet manufactureres and by request, one can usually obtain the results.

Anonymous "Carpet: Boards are buying it, Kids are beating it, and Hardly anybody's replacing it." The American School Board Journal, 158, 10 (April 1971) pp. 27-30

This is a very comprehensive article which gives a detailed description of the worth of carpet as a floor covering, maintenance programs, discusses wearability in specifically chosen buildings, and tells about the benefits of carpet as a wall covering.

Most interesting was the fact that in numerous classrooms and school corridors across the country, carpet has been found to be in use and still viable after 12 to 18 years of service.

Anonymous "Educational Building Practices: Carpeted Interior Replaces Concrete Exterior." American School and University, 44, (July 1972), pp. 34-40

Originally, Dade Christian School, in Hialeah, Florida, consisted of a building in the form of an H; students went outside to get from classroom to classroom. Because of rain, wind and dust, it was decided to enclose the exterior corridors. The problem of huge expansis of hallways to maintain was minimized through the use of carpet.

The article suggests that expenses were cut considerably over sweeping concrete but it gives no cost analysis or other conclusive proof. It does provide a maintenance schedule and name the specific carpet used.

Anonymous "Guide for Planning the Construction of School Buildings: State of New Hampshire, 1971." New Hampshire State Department of Education, 1971, p. 104, EA 006 460

Descriptors - Educational Equipment, Educational Finance, Educational Specifications, Facility Planning, Facility Requirements, Flexible Facilities, Furniture, Legal Responsibility, Professional Personnel, School Construction, School Design, School Environment, School Planning, Site Selection

Identifiers - New Hampshire

Those who are responsible for the planning and implementation of a school plant realize the great changes that have taken place in the total process. Rapidly developing technology, new insights about human behavior, and a growing social conscience demand change in educational methodology. With changing methods, there follows a requirement for different spatial relationships and altered or new facilities to accommodate the new processes. The need is obvious for educational space and equipment that can be easily and economically adjusted to adapt to the educational changes. Construction of school buildings today should not be so permanent in

character that the building determines the program indefinitely, thereby leaving little opportunity for newer methods. This manual keeps such flexibility as a fundamental objective and contains suggestions, recommendations, and minimum requirements with regard to school facility planning.

Cutler, Marilyn H. "Intermediate, Open and Carpeted, Branford's a School that Could Give You Ideas." American School Boards Journal, 160, 3 (May 1973) pp. 48-49

Carpet is shown in this 1972 honor award winning school from the Connecticut chapter of the American Institute of Architects, to be an integral, vital part of the open concept design. Three and one-half acres of carpet muffle or absorb auditory distractions at Branford. Even in the home economics department, seven separate kitchen alcoves contain special carpet designed to withstand the spills and stains that are a matter of course in food preparation areas.

Dole, Edwin K. "What is Carpet? Carpet is What Boards Spend More on Than They Do on Furniture." American School Board Journal, 160, 5 (May 1973) pp. 45-47

Fiber, construction and color are the by-lines of this article.

Select colors that will mask the soil in a given area. This is a highly important aspect of choosing carpet because while all colors soil at the same rate, those that show each foot print and stain will obviously require more maintenance. Lighting should be taken into consideration, also. A color sample that looks bright under one variety of illumination could sink into drab nothingness under nearby but different luminaires - or vibrate and razzle dazzle.

When in doubt, select a mutted tweed. There is quite a variety in the sould absorption qualities of various carpet. Very dense, improperly padded carpet may provide very little absorption while a very loose, high pile may provide so much, that the class cannot hear the teacher. More technically, carpet specifications should include a Noise Reduction Coefficient (N.R.C.). The N.R.C. rating value should be 45. This means that 45 percent of the airborn waves coming into contact with

a carpet are absorbed.

Ninety-one percent of all carpet used in schools is of a construction called tufted. It is a low cost method of manufacturing, but the quality depends on several facts: yarn quality, amount of pile yarn per unit area, quality of backing material, thickness and quality of material applied to the carpet backing. Face weight is determined by the square yard and varies with the type of yarn. Truly serviceable carpets should possess the following weights: nylon, 25 ounces and up; acrylic, 38 to 42; olefin, 28; polyester, 30 to 40; wool, 38 to 42.

Density is determined by the number of tufts per square inch. A short, low, dense pile will wear better than a high pile with exactly the same face weight but with less density.

Droper, Ray "Carpet Cleaning: Which System is Best?" American School and Union, 46, 7 (March 1974) pp. 49-50

While this article deals mainly with various cleaning techniques, it does point out that some fibers are more soil resistant than others. The tests on cleaning show that there are no miracle fibers. All fibers will become soiled, and all soil at about the same rate after the initial cleaning; but the tight weave hard-fiber carpets appear better, longer.

The research showed that between using steam with water jet extraction; dry foam without pickup; spray mist without pickup; rotary brush with no pickup and dry foam with the built in vacuum, that the dry foam with the built in vacuum removed 46.4% of the soil and held the resoil rate to 13.4%. The "steam" - water jet extraction was the poorest of the methods used showing a 15.6 soil removal rate and an 18.7% resoil rate.

The evidence for using the dry foam, vacuum removal method was overwhelming showing a near 20% greater cleaning power ability than the second most succesful method.

Frese, Claudia W. "Give Your School the Silent Treatment: Carpet the Walls, Too!" American School and University, 46, 2 (October 1973) pp.48-52

Research by Claudia Frese, graduate student at Florida State University, with the help of two large carpet manufactures and the university facility and staff produced some enlightening statistics.

By hanging a number of microphones in a specific hallway, and recording voltage data without carpet: with floor carpet; with wall carpet only; with floor and wall carpet combined over a continuous four week span, with the same students using the hall, the following data was obtained: floor carpet reduces overall noise by 37 percent, wall carpet by 24 percent and the combination of floor and wall carpet by 51 percent when compared to the noise level in the corridor before any carpeting was installed.

Residual effects of the noise reduction were found in evidence showing improved student behavior in terms of running and shouting, students and teachers appeared to be in a better frame of mind, and statistics showed a reduction of injuries from slipping and sliding in the hall.

Greater use of the facilities took place because of the warmth provided by the carpet. Students and aides were attracted to use the floor for various studies as little or no furniture was necessary

Finally, the carpet used for this experiment was not selected on the bases of maximum noise absorption The choice of carpet was based on the ordinary criteria considered by school personnel as important. Compactness, durability, ease of maintenance, cost, and antistatic and flame retardant properties were considered in choosing a tightly woven, low loop carpet of 68 percent acrylic, 29 percent nylon, and 3 percent metallic yarn for this study.

Sale, Allen "Picking the Right Flooring." American School and University, 45, 1 (September 1972) pp. 27-32, 34-36, 39

Four kinds of costs affect total maintenance cost of any floor or floor covering: cleaning labor costs; capital equipment costs; expendable supply costs; equipment repair and maintenance costs.

Considering these four points alone, the tests conducted by the Carpet and Rug Institute show that carpet is far less expensive to maintain than any other floor covering except terrazzo. However, there are a number of other cost factors that were not included in the study but obviously worthy of mention. First is the psychological appearance of warmth, prestige and dignity that only carpet can provide. Second is carpet's highly efficient thermal insulation qualities that help cut energy costs. Next, is the fact that carpet is known to reduce accidents caused by slipping and sliding. And last, perhaps most important as a cost factor, is the ability of carpet to reduce noise.

In actuality, carpet's costs should be compared to the cost of other floor materials plus the cost of an equvalent acoustical treatment.

Smith, T.B. "Understanding Carpet Testing" American School and University, 43, 8 (April 1971) pp. 40-47

Carpet specifications and the decision to buy very often concentrate only on matters of carpet construction such as level loop and 5/64" gauge. The specs ignore such critical areas as colorfastness, shrinkage, acoustics, soil and stain resistance, and other characteristics that are actually more important to the life and appearance of your carpet than are the style and color you choose.

Many carpet manufacturers subject their carpets to rigorous testing. Many don't. Some of these tests are based on government and industry standards, other tests are developed by the individual companies, and are, in many cases, exclusive to that company. If there is any local requirement that carpeting installed in our educational facilities be tested, it is certainly the exception.

With carpet test results available, the risk and guess in carpet selection is well reduced. The prudent buyer looks for test results. When he finds them, his next problem is to understand them.

T.B. Smith, Carpet Research Manager for Armstrong Cork Company, discusses some of the carpet tests being performed today, and more importantly, explaines what they mean and how the tests are scored.

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